

N00213.AR.000199
NAS KEY WEST
5090.3a

PROTECTION PLAN REVISION FOR SHORELINE PROTECTION SYSTEM AT SITE 8 WITH
TRANSMITTAL LETTER NAS KEY WEST FL
3/10/1997
BECHTEL ENVIRONMENTAL INC

Bechtel

Oak Ridge Corporate Center
151 Lafayette Drive
P.O. Box 350
Oak Ridge, Tennessee 37831-0350

Telephone: (423) 220-2000

MAR 10 1997

Commanding Officer
Southern Division
Naval Facilities Engineering Command
Attention: Dudley Patrick 1858
2155 Eagle Drive
North Charleston, SC 29406

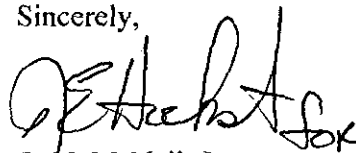
SUBJECT: Bechtel Job No. 22567
Department of the Navy Contract No. N62467-93-D-0936
DO 0004, NAS KEY WEST, SHORELINE PROTECTION SYSTEM - PPR-321-011
Subject Code: 5320

Dear Mr. Patrick:

Enclosed is the approved PPR-321-011. This PPR implements Oceans Breeze's final design for the Shoreline Protection System at IR-8. The drawings and design report in Attachment 1 have already been sent to you (Chron 012245). I have added the Scope of Work and the Technical Specifications as Attachment 4. These are included for your use.

If you have any questions or comments, please feel free to give me a call at (423) 220-2745 or Roy Hoekstra at (423) 220-2271.

Sincerely,



O. N. McNeil, Jr.
Project Manager

REH:dcm:LR1124

Enclosure: As stated

cc: M. Ewing (ROICC) w/e
P. Williams (NASKW) w/e



Bechtel Environmental, Inc.

PROJECT PLAN REVISION

Document Name and No. Remediation Work Plan (Chron 3295) Rev. 0 PPR # 321-011

Site NAS - Key West Task _____ Phase 3 DO No. 4

Initiator: Roy Hoekstra

Description: Complete replacement of Section 4.5 IR-8 - Fleming Key South Landfill

Date: February 18, 1995

Reason: Scope Definition for the remedial work at IR-8.

IMPACT REVIEW

FUNCTIONAL REP.	NO	YES	IDENTIFY AFFECTED DOCUMENTS
PR <i>[Signature]</i> Roy Hoekstra		X	Remedial Work Plan
SEH Supv. <i>[Signature]</i> Randy Summers			
QCM N/A			
Site Super. <i>[Signature]</i> Dick Geer	X		
Other N/A			

[Signature] 2/18/95
Project Manager Date

Change Approved: ___ No ☒ Yes

Trend Required: ☒ No ___ Yes

Navy Concurrence Required: ___ No ☒ Yes

see attached e-mail
Navy Representative Date

Change Approved: ___ No ☒ Yes

Date: 2/24/97 2:41:51 PM
From: J Dudley Patrick
Subject: NAS KW PPR 321-011
To: (ONMCNEIL@AM@ORN6)
To: (REHOEKST@AM@ORN6)

Subject PPR, Shoreline Protection System at IR-8, dated Feb 18, 1997, has been reviewed with the following comments:

1. Attachment 3, Construction Plan, VI. Contingencies, C. Access. Note that the 32 ton load limit for the Fleming Key Bridge shall not be exceeded at any time.
 2. Other than that, and other comments that might come from the NTR and/or NAS KW PWD personnel, you have my concurrence on the subject PPR.
- Dudley

Southern Division, Naval Facilities Engineering Command
P.O. Box 190010
N. Charleston, SC 29419-9010

4.5 IR-8 - Fleming Key South Landfill

The scope of work for IR-8 - Fleming Key South Landfill consists of installation of a shore protection system along 1800 linear feet of this shoreline. The documents to implement this work consist of the following:

- Drawings C-01 through C-05 and the associated Design Report prepared by Delon, Hampton and Associates Attachment 1.
- Design Report Supplement - Attachment 2.
- The Construction Method Plan, Rigging Plan and QC Checklist. - Attachment 3.

The above documents were prepared in accordance with:

- Scope of Work for Shoreline Protection Structure and Design and Construction - 22567-321-SW248-001 R7.
- Performance Specification for Shoreline Protection - 22567-321-SP248-001 R4.

These documents are included in Attachment 4.

Attachment 1.
Drawings and Design Report

Attachment 2.
Design Report Supplement



Delon Hampton & Associates, Chartered

Engineers • Construction and Program Managers

Delon Hampton, Ph.D., P.E.
Elijah B. Rogers
Dennis M. Kamber, P.E., DEE

Efren P. Haili, P.E.

February 13, 1997

Mr. O. N. McNeil, Jr.
Project Manager
Bechtel Environmental, Inc.
Oak Ridge Corporate Center
151 Lafayette Drive
Oak Ridge, TN 37831-0350

Re: **Bechtel Job No. 22567**
NAS Key West Shoreline Protection System

Dear Mr. McNeil:

Attached is a revised Nicolon "Wave" program printout for the reduced thickness block of 190mm (7.5 in.). The analysis shows that a normal thickness block of 190mm allows "no damage" to the integrity of the system. Therefore, the revised block thickness is acceptable for this application.

In addition to the reduced block thickness, recent changes to the configuration of this embankment slope reduce the overall impact of waves onto the system. These changes do not negatively impact the design; therefore, the design remains as previously submitted.

If you have any questions or need additional information, please call.

Sincerely,
Delon Hampton & Associates, Chartered

Stephen W. Murray, P.E.
Group Manager, Civil Engineering

SWM:mi

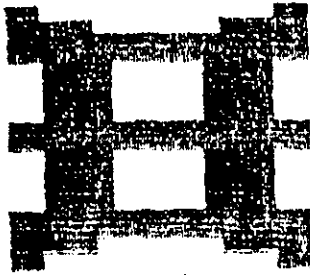
cc: Andrew K. Hackett

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FEB 16 1997

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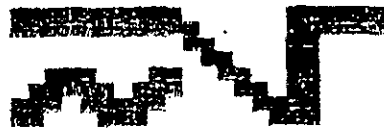
"At DHA, Quality Doesn't Cost, It Pays..."



A R M O R F L E X calculation program

(C) NICOLON B.V. 1998, 1989; version 1.20

calculations : DELFT HYDRAULICS
user interface: BEJAERD PRODUCTIONS



NICOLON B.V.
PostBox 236
7600 AE Almelo
The Netherlands

I N D U S T R I A L T E X T I L E S

tel: ..31 5490 44247 fax: ..31 5490 44490

G E N E R A L P R O J E C T I N F O R M A T I O N

DESIGN CALCULATIONS FOR

PROJECT Identification: NOS Key West, Fleming Key Landfill Revetment

CLIENT Name.....: Ocean Breeze Construction Co., Inc.
Address.....: 10276 Riverside Drive
City.....: Palm Beach Gardens, FL 33410
Phone.....: 561-627-4407
Fax.....: 561-627-4408

Contact.....: Andrew K. Heckatt, CPESC
Date.....: 13 February, 1997

FROM Company.....: Delon Hampton & Associates, Chartered
Contact.....: Stephen W. Murray, P.E., CPESC

SUMMARY OF INPUT DATA

CALCULATION IDENTIFICATION.....: NAS Key West, Fleming Key Shoreline
STRUCTURE slope angle (vert.= 1 ; hor.= 7)..: 3.0
water depth at toe of structure...: 1.8 m
height of structure.....: 3.0 m
WAVE CHARAC. significant wave height.....: 1.09 m
wave period (peak spectrum).....: 10.0 s
ARMORFLEX TYPE: alternative
block thickness.....: 190 mm
density of concrete.....: 2100 kg/m³
JOINT FILLING: ordinary (D 15v: 5mm)

GEOTEXTILE between ARMORFLEX and filter/base: present
potential head over geotextile...: 50.0 mm
at specific discharge.....: 0.03 m/s
FILTER LAYER: present
thickness.....: 0.80 m
grain size.....: 10.00 mm
porosity.....: 0.40
BASE MATERIAL grain size.....: 0.35 mm

RESULTS OF CALCULATIONS

NICOLON BV

DELFT HYDRAULICS

project: NAS Key West, Fleming Key Landfill Revetment

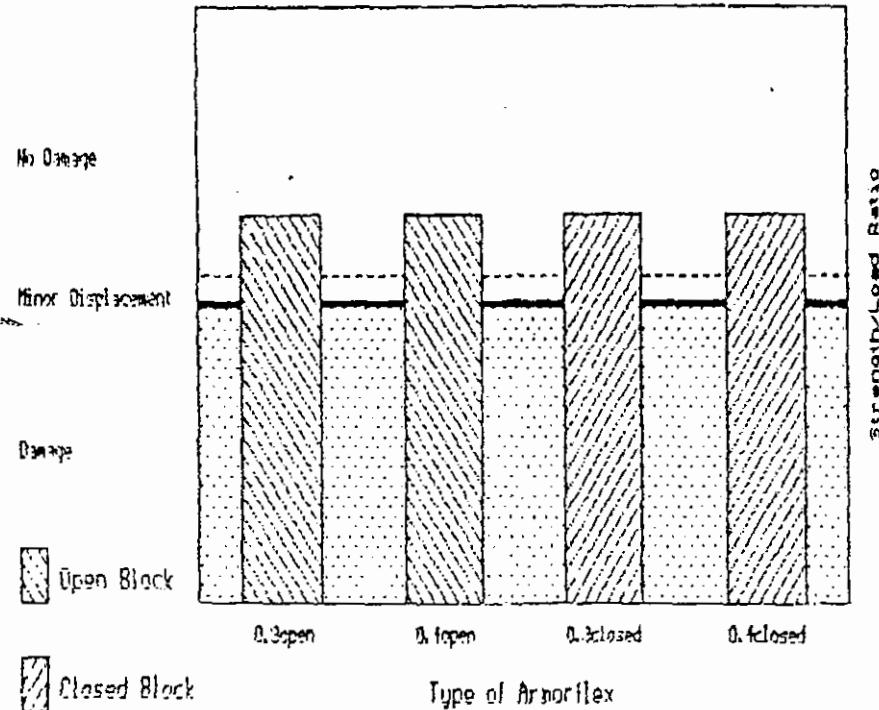
type of ARMORFLEX	EXPECTED PERFORMANCE OF ARMORFLEX			FILTER BASE
	no damage	minor displacements	damage	use geotextile
0.3open	*			
0.4open	*			
0.3closed	*			
0.6closed	*			

EXPECTED PERFORMANCE OF ARMORFLEX

NICOLON bv

DELFT HYDRAULICS

project: HAS Key West, Fleming Key Landfill Revetment



(if flow velocity along structure < 1 m/s)

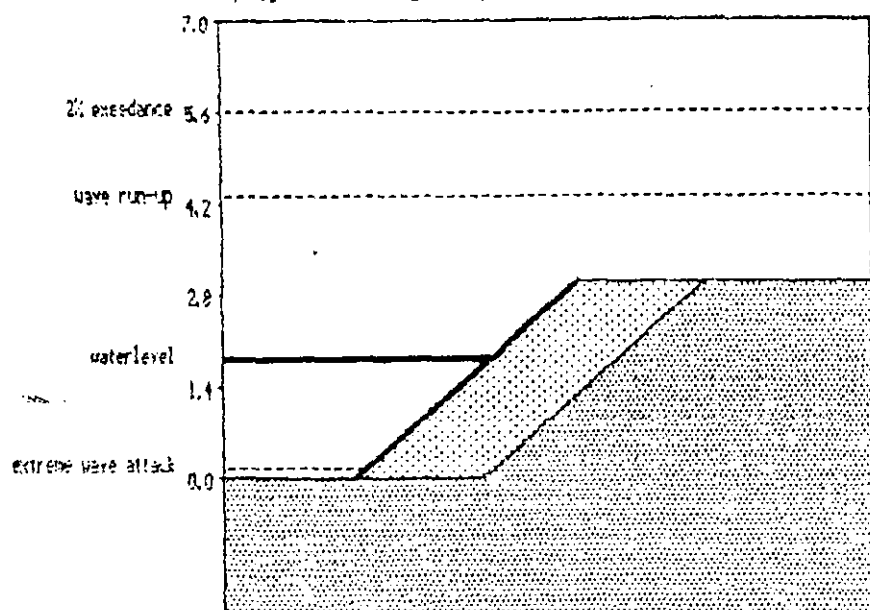
CAUTION: these results are based on the positive interaction of interlocking ARMORFLEX blocks.
 Results cannot be transferred to any other concrete block system!

CROSS SECTION OF CONSTRUCTION

NICOLON Ev

DELFT HYDRAULICS

project: MAS Key West, Flaming Key Landfill Revetment



2% exceedance: 5.58m slope of structure 1:3.0
 wave runup: 4.33m geotextile between ARMORFLEX and
 extreme wave attack: 0.16m thickness of filter: 0.20m
 water depth: 1.80m
 hight of structure : 3.00m

Attachment 3.
Construction Method Plan,
Rigging Plan and QC Checklist



Ocean Breeze Construction Co., Inc.

CERTIFIED EROSION CONTROL SPECIALISTS
10276 RIVERSIDE DRIVE • PALM BEACH GARDENS, FLORIDA 33410
(561) 627-4407 FAX (561) 627-4408



DATE: December 15, 1996
PROJECT: NAS-Key West, Fleming Key Landfill Revetment
PROJECT NO.: 22567-321-0248
RE: CONSTRUCTION PLAN

I. Pre-Construction Meeting

A. Attended by various representatives from the following:

U.S. Navy	NAS Key West
Bechtel Environmental	Ocean Breeze Construction
Delon Hampton & Assoc.	and any other related parties

B. Review Items:

Environmental Permits	Plans and Details
Specifications	Construction Phases
Quality Control	Safety and Health
Material Quantities	Requisitions for Payment
Certified Payrolls	

C. Personnel Requirements:

Name & Address	Social Security Numbers
Site-Specific Training	Safety Meetings

D. Notice to Proceed:

Mobilization Date	Material Procurement
Project Schedule	

II. Mobilization

A. Equipment:

Loader with rake (950)	Dozer (D-4)
Chipper	Excavator (320)
Gradall (880)	Crawler Crane (5299)
Office/Storage Trailer	Vibratory Roller

B. Materials:

Limerock Embankment Fill	Ballast Rock Bedding Stone
Geotextile	Armorflex Blocks
Polyester Cable	Aluminum Sleeves
Corrosion Resistant Rebar	Ready-Mix Concrete
Rock RipRap	Backfill # 57 Stone
Pyramat Blanket	Sand/Soil
Red Mangroves	Sea Purslane
Seed & Mulch	Floating Turbidity Barrier

II. Mobilization (con't.)

C. Sub-Contractors Personnel:

Andrew K. Hackett, CPESC - Project Manager
James C. Simmons - Project Superintendent, Quality Control
Sean Woodward - Rigging Foremen, Safety & Health
Jon Pierson - Installation Supervisor
Lyonel Sergile - Fabrication Supervisor
Operators - 2
Installation Laborers - 4
Fabrication Laborers - 6

* Note: All personnel names, addresses and social security will be submitted prior to mobilization.

D. Sub-Subcontractors:

Stephen W. Murray, P.E., CPESC - Design Engineer
Larry Frank - Surveyor

III Phase 1 *

A. Lay-out:

Baseline	50' Off-sets for Construction R/W
Access Roads	Control Points and Bench Marks
Staging/Trailer Area	Staging area south of 32 T bridge
Vegetation Debris Areas	Concrete Debris Areas
Metallic Debris Areas	Fabrication Areas
Toe Excavation Limits	Fuel Storage

B. Floating Turbidity Barriers:

10' beyond toe excavation limit or seagrass limits	
Anchored every 50'	Vertical Posts every 100'
Returns back to shoreline	Depth of water, 2' to 4'

C. Vegetation Clearing:

Access Roads	Staging Area
Debris Areas	Fabrication Areas
Working area from embankment slope to 50' landward	
Roots stumps and large trees stockpiled in designated debris area	
Small trees and brush to be chipped and stockpiled	
Chipped mulch to be used for sediment control and off-site tracking	

IV. Phase 2 *

A. Embankment Slope Degrubbing:

Removal of debris to a minimum of two feet below the bottom of the block surface elevation.

* Note: Construction "Phases" will overlap. They are separated only to show the major activity groups, I = Lay-out & Clearing, II = Earthwork, Filling & Compaction, and III = Revetment.

NAS Key West Landfill Revetment
Construction Plan
December 15, 1996

IV. Phase 2 (con't)

B. Embankment Fill and Compaction:

Limerock base material to be placed in 2 feet +/- lifts.

Compaction with a vibratory roller.

Overfill slope approximately 1 foot above desired subgrade.

Bring the embankment fill up to the subgrade elevation at the bottom of the bedding stone layer.

C. Armorflex Mat Fabrication:

Assemble and stockpile the mats on the landward side of the R/W.

D. Bedding Stone Placement:

Field cut and sew the geotextile into large panels (100' wide max.).

Excavate the overfilled material slope to the lines and grades.

Excavate the toe trench.

Place the underlying geotextile and pin top and joints as necessary.

Overlap joints a minimum of two feet.

Place bedding stone to the proper thickness and elevations.

V. Phase 3 *

A. Armorflex Installation:

Final grading of the bedding stone to the planned lines and grades.

Place Armorflex Mats on the slope.

Place the connecting "key" blocks to lock the mats together.

Field measure, fabricate and place special mats for a radius

Grout any seams greater than two inches.

B. Anchor Installation:

Excavate anchor trench to the planned dimensions.

Place reinforcement bars running through the mat loops.

Place the Pyramat rolls on the embankment crest with the tail in the trench.

Place anchor concrete into the trench directly from the truck.

Check rebar and loops for alignment.

C. Backfilling and Final Dressing:

Fill the roadway berm area to the desired lines and grades.

Fill sand in the voids of the crest blocks and 3 rows down the slope.

Fill # 57 stone in all the rest of the voids of the blocks.

Place rock riprap in the toe trench and fill voids with stone.

Excavate and /or fill the drainage swale, check dams, and retention ponds.

Roll out the Pyramat and pin as specified.

Backfill the Pyramat with a veneer of sand/soil.

NAS Key West Landfill Revetment
Construction Plan
December 15, 1996

V. Phase 3 (con't)

D. Mitigation Planting:

- Plant Section D with Red Mangroves as specified.
- Plant Sea Purslane in the cells of the blocks along the whole crest.
- Seed and Mulch top of bank, swale retention ponds and all disturbed areas.
- Daily watering for seven days then three times a week for three weeks.

VI. Contingencies

A. Weather:

- No operation of the mat installation crane during electrical storms.
- No pouring of concrete in seams or anchor when raining.
- No final grading if waves exceed the stability of the bedding stone.
- Park all equipment away from the embankment during a major storm.

B. Contamination:

- Should the surface soils be found to be contaminated (ie: heavy metals), all equipment and trucks to be washed down prior to leaving the site if they have been in contact with the site soils. New roadbase material and/or mulch may be used for access roads to eliminate contact with contaminated site soils.
- Uncovered contaminated materials or drums filled with unknown liquids will be undisturbed and handled in accordance with Bechtel "Haz-Mat" procedures.
- Work may continue on another portion of the project until the contaminants are removed from the work area.

C. Access:

- Access to the site will always be provided by the owner for the subcontractor.
- This project is an "Open Shop" site and the subcontractor is a non-union company.
- Additional staging areas may be cleared by the subcontractor if necessary to the efficient performance of this project.

~~The Fleming Key bridge is marked with a limit of 32 tons and if it can not handle the temporary use of 40-ton loads on 18 wheel tractor-trailers, some materials may have to be unloaded on Mustin Street for temporary storage until transferred to an empty truck.~~

Reh
3-10-97

VI. Final Close-Out

- A. As-Built Survey revetment, perimeter road, swale, and retention ponds.
- B. Walk through inspection and complete any "punch-list" items.
- C. Removal of floating turbidity barriers.
- D. Approval of all regulatory agencies, owner and contractor.
- E. Removal of equipment.
- F. Vegetation establishment of 80% +/- thirty days after planting.
- G. Final submittals, certified payrolls, testing, etc.
- H. Final Acceptance of project.

END

Ocean Breeze Construction Co., Inc.



CERTIFIED EROSION CONTROL SPECIALISTS
10276 RIVERSIDE DRIVE • PALM BEACH GARDENS, FLORIDA 33410
(561) 627-4407 FAX (561) 627-4408



DATE: February 3, 1997

PROJECT: NAS-Key West, Fleming Key Landfill Revetment

PROJECT NO.: 22567-321-SC-0248

RE: CONSTRUCTION RIGGING PLAN

SCOPE OF WORK: On site fabrication, lifting and placement of "Armorflex" articulating concrete block mats for the revetment along the western shoreline of the Fleming Key landfill. The individual block units will be fabricated into an eight foot (8') wide mat and the length will equal the required cross-section length per the given Station. The maximum cross-section length is 33.33'. The mats will be lifted with a horizontal spreader bar attached to the two eight foot ends of the mat. The spreader bar will be lifted by the upper 7/8" wire rope slings and attached to a multi-sheaved block and hook from a 50 Ton crawler crane, American 5299.

1) CABLE LOAD CALCULATION:

A) The following calculation determines the weight of the maximum size mat.

One mat equals	Class 60 @ 58 lbs/sf	8' x 36' =	16,704 lbs
	Class 40 @ 38 lbs/sf	8' x 5.33' =	<u>1,620 lbs</u>
		Total mat weight =	18,324 lbs (9.16 T)

Note: The total load for the crane with the 2,500 pound spreader bar is 20,824 lbs. (10.4 Tons). This falls under the "Light Lift" classification.

B) The following calculation determines the factor of safety for the mat cables constructed of 3/8" (0.380') polyester cable, "Duravet", as produced by Samson Ocean Systems.

3/8" cable tensile strength =	10,000 lbs.
60 % sleeve strength ratio =	6,000 lbs.
12 cables per mat =	72,000 lbs.
82% bend at pin ratio =	59,040 lbs.

Factor of Safety = $59,040 / 18,324 = 3.22$ to 1

C) The following items are the components of the spreader, see attached diagram. They are broken up into each lifting connection layer.

Safety Hooks - 12 each @ 2 Ton rating =	24 T / 9.16 T = 2.6 to 1
1/4" Wire Rope - 12 each @ 2.9 Ton rating =	34 T / 9.16 T = 3.7 to 1
1/2" Shackle - 12 each @ 2 Ton rating =	24 T / 9.16 T = 2.6 to 1
1-1/4" Pin - 12 each @ 12 Ton rating =	144 T / 9.16 T = 15 to 1
1" Shackle - 4 each @ 8.5 Ton rating =	34.0 T / 10.4 T = 3.3 to 1
7/8" Wire Rope - 4 each @ 7.6 Ton rating =	30.4 T / 10.4 T = 2.9 to 1
1-3/4" Master Link - 1 each @ 26 Ton rating =	26.0 T / 10.4 T = 2.5 to 1

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2) ON-SITE TEST FOR MAT FABRICATION (As approved by the manufacturer)

- A) Make one mat at the maximum size, 8' x 41.33' = 18,324 lbs
- B) Lay 79 SF Class 60 blocks on top of the = 4,581 lbs (25% of mat weight)
mat equally dispersed from the center. Total = 22,905 lbs
- C) Pick mat up, down and swing for 10 minutes.
- D) Check for slippage at the sleeve connections.

3) LOAD LIFT RADIUS

- A) Review manufacturers "Lift Charts"
- B) Measure swing radius for 80' of boom with a 22,906 load (mat + spreader bar + 10%)
- C) Do Not Exceed specified radius

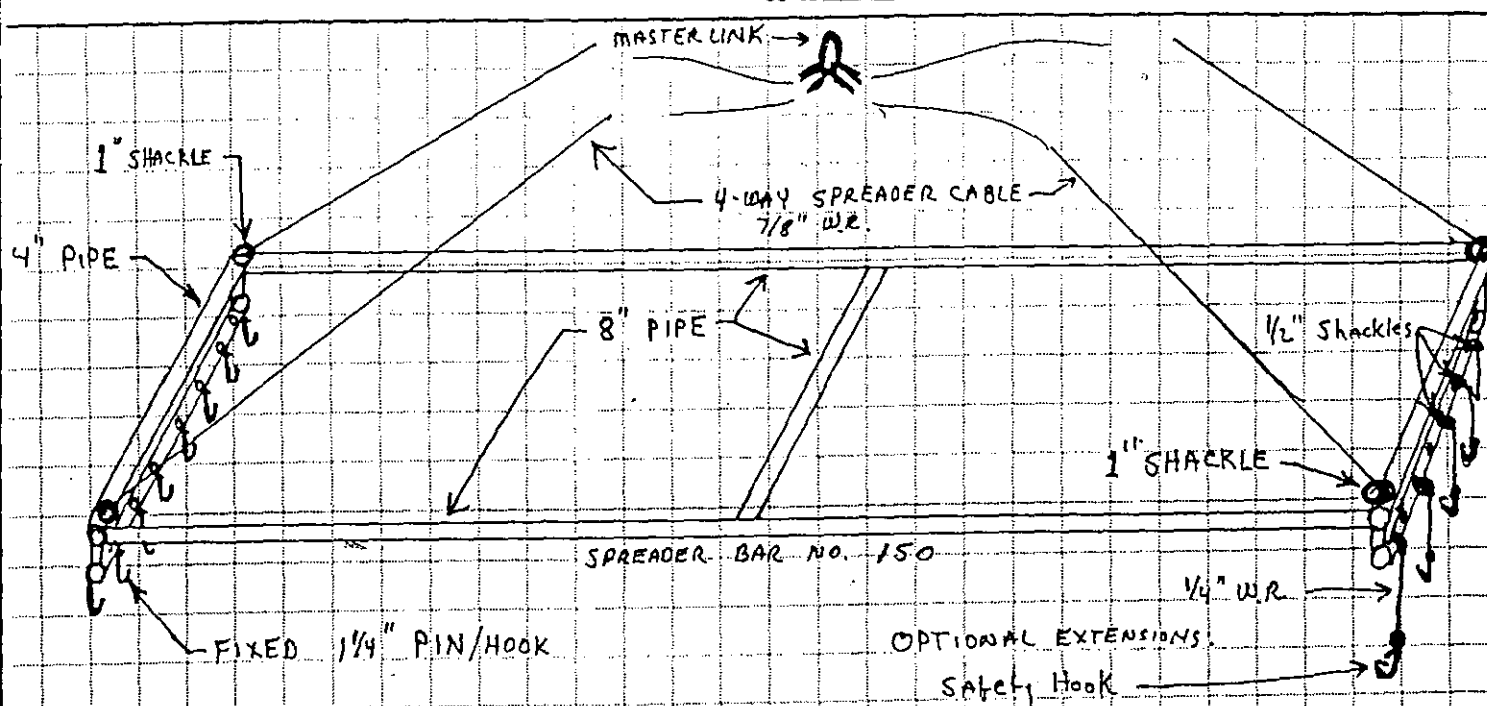
4) ADDITIONAL PRECAUTIONS

- A) The working area of the crane will be within a fifty foot cleared top of bank along the shoreline. The mats will be fabricated and stockpiled approximately every one hundred and fifty feet (150') along the working area on the inside of the site. The outside edge of the cranes tracks must remain at least four feet (4') away from the crest of any down-slopes.
- B) Clear all trees and or branches that will obstruct a clear swing radius for the crane boom and counter weight. There are no underground or overhead utilities.
- C) Personnel are never allowed to be under the lifted mat and/or spreader bar.

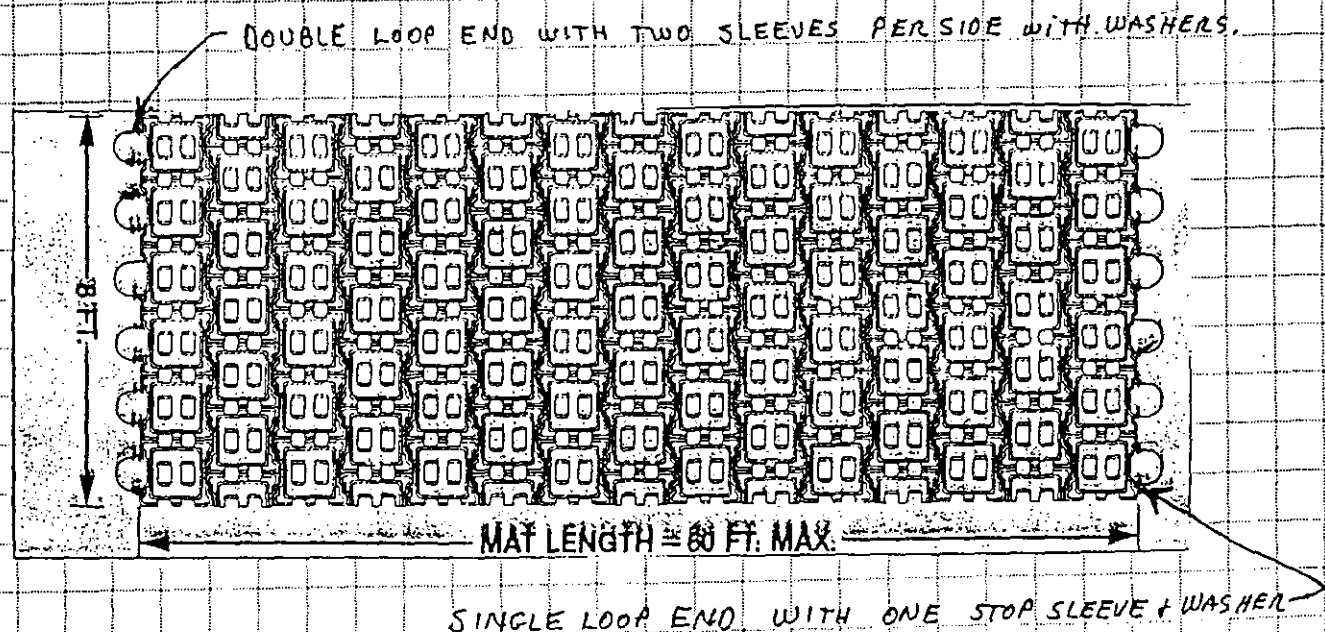
END OF PLAN

**OCEAN BREEZE
CONSTRUCTION CO., INC.**
Certified Erosion Control Specialists
10276 Riverside Drive
PALM BEACH GARDENS, FLORIDA 33410
(561) 627-4407 FAX (561) 627-4408

JOB NAS KEYWEST - Fleming KEY SPS
SHEET NO. 1 OF 1
CALCULATED BY AKH DATE 12/5/96
CHECKED BY _____ DATE _____
SCALE _____



SPREADER BAR



FABRICATED MAT PLAN VIEW

22567-323-0248-0011-(1)-1

Ocean Breeze Construction Co., Inc.



CERTIFIED EROSION CONTROL SPECIALISTS
10276 RIVERSIDE DRIVE • PALM BEACH GARDENS, FLORIDA 33410
(561) 627-4407 FAX (561) 627-4408



DATE: February 3, 1997

PROJECT: NAS-Key West, Fleming Key Landfill Revetment

PROJECT NO.: 22567-321-0248

RE: QUALITY CONTROL CHECK LIST

I. Materials

A. Manufacturers Certificate of Compliance (prior to delivery)

Armortec, Incorporated

- Armorflex Blocks, Class 40 and Class 60
- Polyester Cable, 3/8"
- Aluminum Sleeves, 3/8"

Nicolon Corporation

- Woven Geotextile, 40/10

Synthetic Industries, Inc.

- Pyramat erosion control blanket (ECB)

B. Fill Gradation Quality Assurance Report (prior to delivery)

CSR Rinker, Aggregate Division

- No. 1 Limerock Base for embankment fill
- No. 4 Crushed Rock for bedding Stone Layer
- No. 89 Crushed Rock for blocks open cell infill

C. Excavated On-Site Material for Embankment Fill (first use & as needed)

Material shall be free of any organic material, i.e. wood, etc.

Material shall be compactable with trace silts and clays

D. Lab Test Reports (prior to delivery)

CSR Rinker, Block Division

- Weight / Block for each Class
- Compressive Strength for each Class
- Water Absorption for each Class

II. On-Site Testing

A. Protected Vegetation (at mobilization)

Bechtel and Ocean Breeze Construction

- Staking the upward limits of the seagrass beds

B. Water Quality & Sediment Controls (daily)

Bechtel and Ocean Breeze Construction

- Visual turbidity containment within the floating turbidity barriers
- Visual Off-site tracking

C. Embankment Compaction (as required)

Local Certified Testing Lab

- Proctor and Density test for excavated material used in embankment fill
- Density test for limerock embankment base fill per the specifications

D. Concrete Test Cylinders (as required)

Local Certified Testing Lab

- Concrete anchor per the specifications

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22567-323-0248-0012 - (1) - 2

III. Installation

- A. Mat Fabrication (daily)
 - Bechtel and Ocean Breeze Construction
 - See Rigging Plan
- C. Geotextile (daily)
 - Bechtel and Ocean Breeze Construction
 - Sewn seams and overlaps per the specifications
- B. Bedding Stone Layer (daily)
 - Bechtel and Ocean Breeze Construction
 - Thickness spot checks
- D. Subgrade Lines and Elevations (daily)
 - Bechtel and Ocean Breeze Construction
 - 3(H) to 1(V) Slope Template
 - Field survey from benchmarks and off-sets
- E. Armorflex Mats (daily)
 - Bechtel and Ocean Breeze Construction
 - Seams 3" or more to be grouted
 - Cracked blocks to be replaced or grouted
 - Manufacturers representative on-site inspection
- F. Concrete Anchor (daily)
 - Bechtel and Ocean Breeze Construction
 - Dimensions
 - Rebar to be in the center of the trench
 - Cable loops tension to be hand tight
- G. Pyramat ECB (daily)
 - Bechtel and Ocean Breeze Construction
 - Overlaps and Pins per specifications
 - Manufacturers representative on-site inspection
- H. Mitigation Planting (daily)
 - Bechtel and Ocean Breeze Construction
 - Installation training by Coastal Revegetation, Inc.
 - Confirm tidal elevations for optimum planting
 - Sea Purslane and Red Mangroves to be healthy upon delivery
 - Sea Purslane and Upland Seed watering frequency
- I. Complete Revetment (as required)
 - Bechtel and Ocean Breeze Construction
 - "As-Built" drawings and survey records reviewed weekly
 - Design Engineer on-site inspection
 1. Prior to Armorflex installation
 2. Middle of Armorflex installation
 3. Substantial completion
- J. Personnel Training (at mobilization)
 - Ocean Breeze Construction
 - Quality and Safety always takes priority over production
 - Periodic training videos will be given on erosion and sediment control and related topics emphasizing quality performance of each task

End of Section

Page 2

22567-323-0248-0012-(1)-2

Attachment 4.
Scope of Work and
Performance Specification


DEPARTMENT OF THE NAVY

SOUTHERN DIVISION

PERFORMANCE SPECIFICATION

FOR

SHORELINE PROTECTION STRUCTURE

4	1/8/97	Deleted Section 3.7	REH	KSA	JRM	REH
3	2/23/96	Minor Revisions	REH	KSA	JRM	REH
2	8/23/95	Revision to Section 3	PJR	TD	FBC	REH
1	5/15/95	Minor revision	REH	JRM	FBC	REH
0	2/8/95	Issued for use	GAC/RKA	RKA/NJA	FBC	JRM
REV.	DATE	REASON FOR REVISION	BY	CHECK	EGS	PE
ORIGIN		SHORELINE PROTECTION STRUCTURE	JOB NO. 22567			
			PERFORMANCE SPECIFICATION			REV.
			321-SP248-001			4
			Sheet 1 of 6			

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**PERFORMANCE SPECIFICATION
FOR
SHORELINE PROTECTION STRUCTURE**

1.0 GENERAL

1.1 SCOPE

A shoreline protection structure is required at the Fleming Key South Landfill to control wave erosion of the shoreline. The Subcontractor shall design and construct a shoreline protection structure meeting the performance requirements outlined in this specification. The configuration and type of protection shall be determined by the Subcontractor, subject to approval by BEI, based on the Subcontractor's experience and parameters listed below. The Subcontractor may recommend a pre-engineered structure (e.g., articulated concrete mat) provided it meets the requirements herein.

The design shall consider the following parameters:

- Cost effectiveness
- Longevity of the shoreline protection structure
- Damage limitation
- Overtopping
- Scour and flank protection
- Permeability
- Wave reflection
- Appearance
- Environmental criteria
- Federal, state and local codes and regulations

Design and performance criteria for each of the above items is discussed below.

1.2 REFERENCED CODES AND STANDARDS

U.S. Army Corps of Engineers, *Shore Protection Manual* (USACE SPM), Coastal Engineering Research Center, Vicksburg, Mississippi.

Navy Facilities Engineering Command, Department of the Navy, *Coastal Protection Design Manual* 26.2 (NAVFAC DM-26.2), Alexandria, Virginia.

Construction Industry Research and Information Association (CIRIA), *Manual on the Use of Rock in Coastal and Shoreline Engineering*, CIRIA Special Publication 83, published by A.A. Balkema, Rotterdam.

In addition, the design and construction of the structure shall meet, in all respects, the applicable federal, state, and local codes and regulations and shall comply with requirements of any permit issued for the shoreline protection structure.

1.3 SUBMITTALS

Submittals are summarized on Exhibit F (Attachment A), "Subcontract Submittal Requirements Summary."

1.3.1 Preliminary Design Report

The preliminary design report shall include all calculations, assumptions, references (including applicable building codes), sketches, material specifications, and drawings relevant to the design of shoreline protection.

1.3.2 Final Design Report

The final design shall include all calculations, assumptions, references, sketches, material specifications, and drawings relevant to the design of shoreline protection. The final design shall be sealed by the responsible Professional Engineer licensed in the State of Florida. In addition, a summary of Bechtel and Government comments, with their resolutions, shall be submitted.

1.3.3 Construction Method Report

The Subcontractor shall submit a report identifying the proposed construction method for installation of the shoreline protection structure. This report shall identify all personnel (e.g., craft, supervision, quality control inspectors, etc.) and equipment that will be used during the construction, as well as permit and inspection requirements by federal, state, and local governments. A summary of quality control (e.g., testing requirements, incremental measurements, etc.) shall be included in this submittal.

1.3.4 Permits

The Subcontractor shall prepare all applicable federal, state, and local permits and all supporting documentation required to perform the work. For those permits requiring Navy signature, the Subcontractor shall prepare the permit applications and submit them to Bechtel, who will coordinate obtaining any required Navy signatures.

2.0 PRODUCTS

2.1 SPECIFICATIONS

The Subcontractor shall provide specifications for the materials to be used in construction of the shoreline protection structure. Materials shall be suitable for the exposure conditions existing at the jobsite.

Catalog cuts of materials or pre-engineered structures may be submitted as specifications.

3.0 EXECUTION

The following sections provide information for development of the design report. These sections should, at minimum, be discussed in the design report.

3.1 GENERAL

The following requirements shall be incorporated into the shoreline protection structure design:

- No vertical seawalls, unless it can be shown that the wave reflection requirements in Section 3.7 can be met.
- Toe of riprap cannot be located more than 10 ft offshore from the existing mean high water line.
- Construction of structure must not damage or destroy federally protected vegetation (i.e., mangroves), or alternately if protected vegetation will be affected, appropriate mitigation measures must be incorporated.
- Erosion due to storm action and local ship traffic shall be considered in the design.

3.2 COST EFFECTIVENESS

The baseline for cost comparison shall be shoreline stabilization using stone fill over a geotextile liner (both appropriately keyed into the shoreline). The Subcontractor shall consider longterm maintenance (50-yr period) as well as initial construction costs.

3.3 LONGEVITY OF SHORELINE PROTECTION

The shoreline protection shall be designed using durable materials that will withstand the saltwater environment over a design life of 50 yr. The structure shall be designed and constructed in accordance with the current issue of the USACE SPM, or NAVFAC DM 26.2. The design shall consider the simultaneous occurrence of the 50-yr wave, the 50-yr storm surge, and the 10 percent exceedance astronomical tide level. Groundwater levels during the design storm shall be consistent with the 50-yr rainfall event.

3.4 DAMAGE LIMITATION

Estimated damage during the 50-yr wave and storm surge event shall be less than 10 percent as defined by the USACE SPM for multiple-layer armor stone protection. An optimization analysis may be performed to justify a lesser design; for example, a design based on a 20- or 25-yr storm.

3.5 OVERTOPPING

The crest height and the materials for the shoreline protection shall be selected such that the average overtopping rate during the annual storm (including the 1-yr storm surge and 10 percent exceedance tide level) shall not exceed 50 liters/sec/meter unless the area immediately behind the crest is protected against scour from overtopping and incorporates a drainage system to return the overtopping flow to the ocean.

The 50-yr wave and storm surge value shall not exceed 200 liters/sec/meter for the design significant wave height, unless a scouring protection and drainage system is included and is based upon the 50 yr values. Average overtopping rates shall be calculated using the approaches outlined in the CIRIA Special Publication No. 83. Other methods may be used only upon written consent from Bechtel.

The crest height may vary along the shoreline if it can be shown that there is a significant variation in the design wave height along the structure.

3.6 SCOUR/FLANK PROTECTION

The shoreline protection shall have a properly designed toe in the form of a cutoff wall or a stone apron, such that it will be stable under the design 50-yr wave and storm surge conditions.

The ends of the shoreline protection shall be carried far enough inland that the erosion in the vicinity of the ends of the seawall, under the design conditions, will not impact the landfill.

3.7 WAVE REFLECTION

"This requirement has been deleted."

3.8 APPEARANCE

The structure shall be constructed such that its appearance is in harmony with the surrounding environment, and that it meets applicable local codes.

3.9 ENVIRONMENTAL CRITERIA

The design and construction of the shoreline protection shall meet applicable environmental criteria, including limitations on sediment disturbance during construction, alterations to the local littoral drift during the life of the shoreline protection, and re-vegetation requirements.

3.10 OTHER CRITERIA

The design criteria presented in this specification is not intended to be all inclusive of criteria required in applicable federal, state, and local codes and regulations. A design basis shall be submitted along with the Preliminary and Final Design Reports and shall include but not be limited to the following items:


- A list of reference/guidance documents used for design.
- Design parameters (e.g., Sections 3.1 - 3.8 of this Technical Specification and any additional criteria required by applicable codes and regulations).
- A list of all applicable permits required to perform the work.

SOUTHERN DIVISION

SCOPE OF WORK

FOR

SHORELINE PROTECTION STRUCTURE DESIGN AND CONSTRUCTION

7	6/10/96	Added Figures 2 and 3	Reh	USA	Sh	Reh	
6	2/23/96	General Revision	REH	KSA	JRM	REH	
5	1/23/96	Revision to Section 1.1	KSA	REH	JRM	REH	
4	9/5/95	Revision to Sections 1.3 and 1.4	TD	REH	TRW	REH	
3	08/23/95	Revisions to Figure 1	PJR	TD	FBC	REH	
2	05/22/95	General revisions	ANS	KSA	FBC	REH	
1	04/06/95	Revisions throughout; new Section 1.7	KSA	JRM	RTJ/FBC	JRM	
0	02/08/95	Issued for use	GAC	NJA	FBC	JRM	
REV.	DATE	REASON FOR REVISION	BY	CHECK	EGS	PE	
<div>ORIGIN</div> <div></div>		SHORELINE PROTECTION STRUCTURE DESIGN AND CONSTRUCTION	JOB NO. 22567				
			SCOPE OF WORK				REV. 7
			321-SW248-001				
			Sheet 1 of 7				

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SCOPE OF WORK FOR SHORELINE PROTECTION STRUCTURE DESIGN AND CONSTRUCTION

1.0 WORK INCLUDED

1.1 GENERAL

The work defined by this scope includes the furnishing of all labor, supervision, technical and professional services, equipment, tools, materials, supplies, and incidentals necessary for design and construction of a shoreline protection structure at the Fleming Key South Landfill at Key West, Florida.

Installation of shoreline protection shall be performed for the southwestern portion of Fleming Key in the vicinity of the Fleming Key South Landfill (IR-8) as shown in Figure 1.

The objective of this task is to establish shoreline protection to prevent further erosion. Due to the close proximity of the shoreline to an existing landfill area, uncontrolled erosion could compromise the integrity of the landfill. Secondly, the effort should result in an improvement of the aesthetics of the area. The shoreline protection shall be considered in four sections as shown on Figure 1.

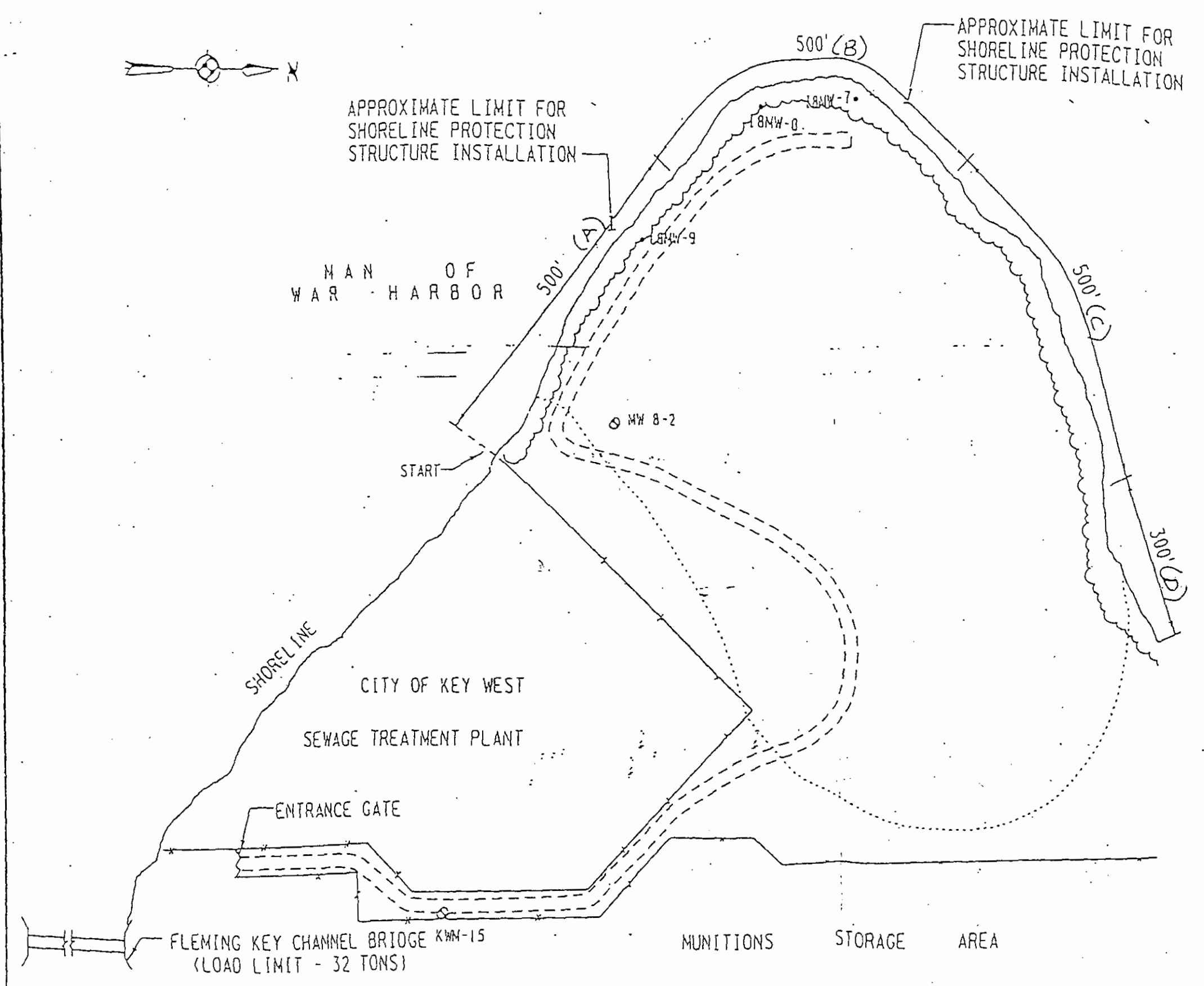
Installation of shoreline protection shall include, but not be limited to:

- Installation of temporary erosion and sediment control structures around the work area ,
- Removal of debris along the shoreline
- Excavation and backfill of the shoreline slope (as required)
- Installation of a shoreline protection structure
- Removal of temporary erosion and sediment control structures
- Revegetation

Contaminated/hazardous material is not anticipated; however, if encountered, it will be handled according to changes clause.

1.2 SHORELINE PROTECTION DESIGN

The Subcontractor shall prepare a design for a shoreline protection structure showing each section (A, B, C, and D) to meet the requirements provided in Performance Specification 22567-321-SP248-001, "Performance Specification for Shoreline Protection Structure," all permit requirements, as well as federal, state, and local codes and regulations. Where the Performance Specification conflicts with federal, state and/or local codes, the more stringent requirements shall be followed. Both a preliminary and a final design (including all calculations, references, assumptions, catalog cuts, material samples, construction methods, a detailed construction schedule, and drawings relevant to the design of shoreline protection and area drainage) shall be submitted to Bechtel for review and approval. The preliminary design includes enough detail to show that the proposed system will meet all design requirements. The final engineering drawings and report shall be adequate for the permitting process, in sufficient detail for Bechtel to verify that the system is correctly installed, and shall include resolution of Bechtel's and the government's comments. The final engineering drawings and calculations shall be sealed by the responsible Professional Engineer who is licensed in the State of Florida and hired by the Subcontractor.

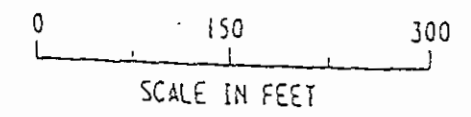


NOTES:

1. SOURCE OF FIGURE IS INTERNATIONAL TECHNOLOGY CORPORATION (CCN000363). BECHTEL HAS ADDED THE APPROXIMATE LIMITS FOR SHORELINE PROTECTION INSTALLATION AND NOTES.
2. SHORELINE PROTECTION STRUCTURE INSTALLATION SHALL BE IN ACCORDANCE WITH THE SCOPE OF WORK.
3. THE ACTUAL LOCATION AND LENGTH OF THE SHORELINE PROTECTION WILL BE DETERMINED BY THE NAVY.
4. THE SERVICE ROAD IS AN UNIMPROVED DIRT ROAD. IT IS CURRENTLY OVERGROWN WITH SHRUBS.

LEGEND

- *—*— FENCE
- I8MW-1 TEMPORARY WELL POINT
- I8MW-18 MONITORING WELL
- ESTIMATED LANDFILL BOUNDARY



1.3 PERMITS

The Subcontractor shall prepare all relevant permit applications for the Navy's signature. Bechtel will be responsible for obtaining the Navy's signature and working with permit authorities to expedite the permit process. The Subcontractor will be responsible for preparing any required responses to questions generated by the permit reviewers. Any permit fees will be paid by others.

1.4 MOBILIZATION

Mobilization includes delivering to the site all labor, supervision, technical and professional services, equipment, tools, materials (excluding construction materials), supplies, and incidentals necessary to perform the work described in this Scope of Work. The Subcontractor shall perform any site improvements needed to access the work area. The Subcontractor shall determine the requirements for on- and offshore equipment.

The Subcontractor will not be allowed to commence work onsite until all pre-mobilization submittals are received and approved by Bechtel and all required permits have been issued.

1.5 SPECIAL CONDITIONS

If the Subcontractor uses offshore equipment as part of the construction equipment for this task, the following requirements shall be met. Personnel operating or located on offshore equipment shall have available radio contact with shore. The Subcontractor shall provide means of communication with offshore personnel to the Bechtel Project Superintendent as needed. Transportation of Subcontractor and Bechtel personnel to and from offshore equipment shall be provided by the Subcontractor.

1.6 DEBRIS REMOVAL

All debris (e.g., concrete, scrap metal, wood, plastic, etc.) along the shoreline which would interfere with construction or performance of the shoreline protection structure shall be removed and placed on top of the existing landfill, as directed by Bechtel. The haul distance for the debris will not exceed 100 yards.

1.7 CLEARING

Subcontractor shall be responsible for any clearing of trees, shrubs, and brush necessary for access to the site and installation of the shoreline protection structure. Areas to be cleared shall be indicated on subcontractor drawings, and subcontractor shall not clear outside these areas unless approved by Bechtel. Subcontractor shall protect any mangroves or other environmentally sensitive vegetation outside the area to be cleared. Debris from clearing shall be placed on top of the existing landfill, as directed by Bechtel. The haul distance will not exceed 100 yd.

1.8 EARTHWORK

Earthwork shall be performed as necessary to facilitate installation of shoreline protection. The shoreline protection design shall specify the required testing and earthwork requirements.

Any excavated soil shall be stockpiled onsite in an area specified by Bechtel. Any work required to make this area suitable for stockpiling shall be provided by the Subcontractor. Upon completion of construction, any excess soils shall be graded to taper into the existing landscape.

Sediment and erosion controls shall be installed prior to beginning any earthwork activities. A Sediment Control Plan shall be submitted to Bechtel prior to mobilization. The plan shall include, as necessary, sediment and erosion control measures/structures; description of materials; location, phasing, and method of installation; dewatering plan(s); and proposed maintenance. The sediment and erosion control plan shall meet all permit requirements.

1.9 SHORELINE PROTECTION INSTALLATION

Shoreline protection shall be installed along the section of shoreline determined by the Navy and designated by Bechtel (Figure 1); shall be configured as shown on Figures 2 and 3; and shall be installed in accordance with the design documents; all permit requirements; and all federal, state, and local codes and regulations.

The installed structure shall match the lines and specifications of the final engineering drawings approved (reference to "engineering drawings" shall be to the Subcontractor's final engineering drawings as reviewed by Bechtel). Quality control inspections (in addition to the Subcontractor's QC/QA inspections) will be performed by Bechtel. Should inspections show installation does not meet the engineering drawings, the Subcontractor shall correct the deficiency at no additional cost to Bechtel or the Federal Government.

Installation of the shoreline protection structure shall not damage existing well points, the approximate locations of which are shown on Figure 1. Caution shall be exercised to avoid damage to environmentally sensitive areas at the site (e.g., wetlands, mangroves, marsh rabbit habitat, etc.).

1.10 SITE RESTORATION AND REVEGETATION

The Subcontractor shall supply all labor, equipment, and supplies necessary to properly restore and/or revegetate the affected area. If the Subcontractor utilizes the existing access road, the road shall be restored to the condition existing before use by the Subcontractor.

Any wetlands, mangrove areas, marsh rabbit habitats, or other federally protected areas disturbed during work activities shall be restored to conditions similar to those existing prior to the start of work. Any plants removed or damaged shall be replaced with the same species in the same location, if possible, or in a nearby location, in accordance with planting directions given by the vendor and in compliance with local, state, and federal requirements. Revegetation includes but is not limited to preparing the areas to be revegetated and providing and placing appropriate plants for the geographical location, fertilizer, groundcover, or other necessary components. If the construction activities damage exotic species such as Australian Pines, Brazilian Peppers, etc., they will not need to be replaced.

1.11 WETLANDS MITIGATION PLAN

A Mangrove/Wetlands Mitigation Plan will be prepared by the subcontractor *if required* by the permits. The preparation and implement of this plan is not in the current scope and will be added according to

SECTION A TRANSITIONS FROM EXISTING TO + 100'
SECTION B ELEV. + 100'
SECTION C ELEV. + 100'
SECTION D TRANSITIONS FROM + 100' TO EXISTING



Figure 2. Typical Shoreline Protection Cross Section

STATION	TOE ELEV.	TOP ELEV.	SECTION LENGTH	A-FLEX SQ.FT.	CUT CU.YD.	FILL CU.YD.
0+00	-2.00	5.00	22.77	46	0	0
1+00	-2.00	10.00	33.33	2,805	75	285
2+00	-2.00	10.00	33.33	3,333	95	630
3+00	-2.00	10.00	33.33	3,333	115	790
4+00	-2.00	10.00	33.33	3,333	105	817
5+00	-2.00	10.00	33.33	3,333	85	778
6+00	-2.00	10.00	33.33	3,333	95	675
7+00	-2.00	10.00	33.33	3,333	100	700
8+00	-2.00	10.00	33.33	3,333	85	760
9+00	-2.00	10.00	33.33	3,333	95	495
10+00	-2.00	10.00	33.33	3,333	145	225
11+00	-2.00	10.00	33.33	3,333	185	220
12+00	-2.00	10.00	33.33	3,333	298	181
13+00	-2.00	10.00	33.33	3,333	319	149
14+00	-2.00	10.00	33.33	3,333	333	148
15+00	-2.00	10.00	33.33	3,333	255	201
16+00	-2.00	10.00	33.33	3,333	120	257
17+00	-2.00	7.50	29.33	3,133	85	308
18+00	-2.00	5.00	22.77	2,805	65	155
Flank	-2.00	5.00	22.77	46	0	0
TOTALS				58,630	2,655	7,772

MAT SCHEDULE

MAT TYPE	MAT WIDTH	MAT LENGTH	NO. ROWS	AREA EACH (SF)	QTY. EACH	TOTAL SQ. FT.
A	8.0	22.67	17	181.38	2	362.72
B	8.0	24.00	18	192.00	3	576.00
C	8.0	25.33	19	202.64	4	810.56
D	8.0	26.67	20	213.36	5	1,066.80
E	8.0	28.00	21	224.00	4	896.00
F	8.0	29.33	22	234.64	6	1,407.84
G	8.0	30.67	23	245.38	5	1,226.80
H	8.0	32.00	24	256.00	6	1,536.00
I	8.0	33.33	25	266.64	191	50,928.24
TOTALS					226	58,811

Figure 3. Estimated Quantities

the changes clause of the contract. The Subcontractor shall prepare a Mangrove/Wetland Mitigation Plan to document mitigative measures to be used in constructing the shoreline protection structure and in establishing site restoration requirements. The plan must identify the measures that will be taken to comply with the "Mangrove Trimming and Preservation Act," Florida Statutes, Sections 403.9321-403.9333. This plan must be reviewed and approved by Bechtel prior to mobilization. Authors of the Mangrove/Wetland Mitigation Plan should have prior work experience and academic qualifications in this area. The plan should include a baseline survey and will be used for maintaining the wetland after planting, restoration, and inundation.

1.12 DEMOBILIZATION

Demobilization includes removing from the site, both on- and offshore, all personnel, equipment, tools, materials, supplies, and incidentals used to perform the work described in this Scope of Work and as supplemented by task specific scoping documents.

1.13 CLOSURE REPORT

The closure report shall include as-built drawings, a statement of completion, and certification by a registered professional engineer and shall meet all permit requirements. All deviations from the approved design drawings shall be noted on the as-built drawings. This report must be submitted within 21 calendar days from the completion of the construction.

1.14 SUBMITTALS

Submittals are summarized on Exhibit F (Attachment A), "Subcontractor Submittal Requirements Summary."